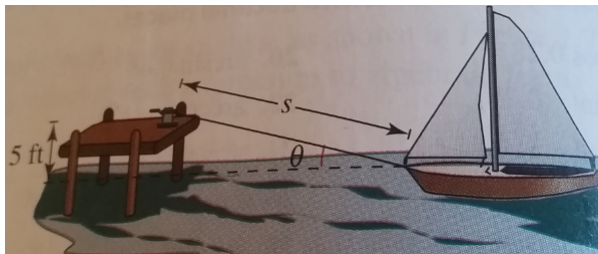


Worksheet 46 - Inverse Trig Functions

1. A boat is pulled in by means of a winch located on a dock 5 feet above the deck of the boat (see figure). Let θ be the angle of elevation from the boat to the winch and let s be the length of the rope from the winch to the boat.



(a) Write θ as a function of s .

(b) Find θ when $s = 40$ feet and $s = 20$ feet.

2. When whole corn is stored in a cone-shaped pile 20 feet high, the diameter of the pile's base is about 82 feet.
- (a) Find the angle of repose for whole corn as we did in class for rock salt.

(b) How tall is a pile of corn that has a base diameter of 100 feet?

3. From a point 50 feet in front of a church, the angles of elevation to the base of the steeple and the top of the steeple are 35° and 47° , respectively. Find the height of the steeple.

4. An observer in a lighthouse 350 feet above sea level observes two ships directly offshore. The angles of depression to the ships are 4° and 6.5° . How far apart are the two ships?
5. A buoy oscillates in simple harmonic motion as waves go past. Hence, its motion can be modeled by a sinusoid. It is noted that the buoy moves a total of 3.5 feet from its low to high point and it returns to its high point every 10 seconds. Write an equation that describes the motion of the buoy relative to sea level if its high point is at $t = 0$.
6. A ball that is bobbing up and down on the end of a spring has a maximum displacement of 3 inches. Its motion (in ideal conditions) is modeled by $y = \frac{1}{4} \cos(16t)$ for $t > 0$, where y is measured in feet and t is the time in seconds.
- (a) Graph the function.
- (b) What is the period of the oscillations?
- (c) Determine the first time the ball passes of equilibrium (where the spring is neither compressed nor expanded), that is where $y = 0$.